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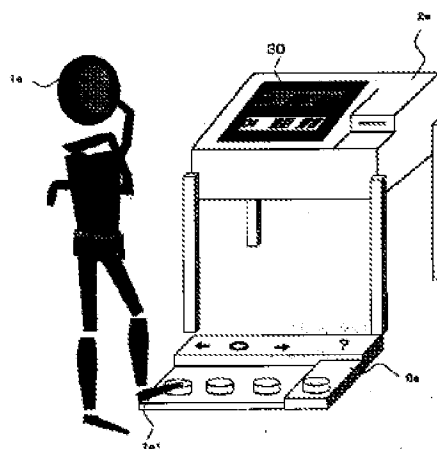(54) [Title]   ELECTRONIC VOTING DEVICE

(57) <u>Abstract</u>

Problem

    To provide an electronic voting device that allows physically impaired voters to vote as easily as physically unimpaired voters, and that can guarantee the protection of personal information.

Solving Means

    An electronic voting device that is comprised of a voting terminal 2a equipped with a graphical user interface (GUI) and a foot switch 6a, whereby voting can be performed by a voter 1a based on information displayed on a display screen (LCD panel) 30 and by performing operations using only the foot switch 6a, which has a few switches (a Forward switch, Back switch and Confirmation switch) 6b, 6c, and 6d.

[There are no amendments to this patent.]

<u>Claims</u>

1. Electronic voting device with which voting is performed by selecting information pertaining to a specific candidate from information pertaining to multiple candidates displayed on a prescribed display screen,

the electronic voting device being characterized by a display means that displays the aforementioned information pertaining to multiple candidates on the aforementioned display screen;

and an operation means that is constructed with a form and at an installation position whereby it is possible for the operator to use a foot to select the information pertaining to a specific candidate from the aforementioned displayed information pertaining to multiple candidates.

2. Electronic voting device recorded in Claim 1, characterized in that the aforementioned operation means has a help switch for the purpose of transmitting to a prescribed reception means a help signal for requesting assistance.

3. Electronic voting device recorded in Claim 1 or 2, characterized in that the aforementioned operation means has:

tentative selection switches for the purpose of tentatively selecting any information among the aforementioned information pertaining to multiple candidates displayed on the aforementioned display screen;

and a Confirmation switch for the purpose of confirming the information tentatively selected as the information pertaining to the aforementioned specific candidate being voted for using the aforementioned tentative selection switches.

4. Electronic voting device recorded in Claim 3, characterized in that the aforementioned tentative selection switches include a forward direction switch that goes forward in the aforementioned information that is tentatively selected and a reverse direction switch that goes back in the aforementioned information that is tentatively selected.

5. Electronic voting device recorded in Claim 1-4, characterized in that the aforementioned display means switches the display of the information pertaining to the aforementioned multiple candidates screen by screen.

<u>Detailed Explanation of the Invention</u>
[0001]
Technical field of the invention

The present invention pertains to an electronic voting device used for voting in an election; in particular, it pertains to a computerized electronic voting device that reduces the work load of the voter and the administrator, simplifying and facilitating the voting operation

and the voting management operation, and that is able to produce a highly reliable and impartial election in which the voting is performed based on an operation by the voter himself.

[0002]
Prior art
Problem to be solved by the invention

Conventionally in elections for, for example, the Japanese Diet, for governors and councilors of prefectures and cities, and for governors and councilors of cities and villages, postcards which serve as polling station admission tickets are mailed from the local governments to voters based on the Public Offices Election Act, and the voter carries that postcard to the polling station, and it is confirmed that [this voter] is the voter himself by referring to a roster of voters. Then, a paper ballot is provided and voting is performed by entering the name of a candidate on that paper ballot and placing the ballot in a ballot box. Next the ballot boxes are collected at a facility such as a gymnasium and officials count the ballots and the voting results are tabulated; such is the process. Furthermore, instructions for filling out the paper ballot when voting are provided by means of verbal instructions from the polling station officials when the paper ballot is handed out, and by written instructions regarding the locations to be filled out on the paper ballot.

[0003]
Accordingly, conventionally there is the problem in that a large operating load and work load are placed on the voters and the election administrators, and much time and effort are required to vote, and this is one factor that hinders improvements to the voting rate.

[0004]
In the midst of this situation, as computers have proliferated in recent years and information technology (IT) has developed, an electronic voting system which is a paperless voting system that uses a computer has been invented, and has been disclosed previously in Japanese Patent Publication No. 2747171. This is a system whereby the voter casts ballots by performing input operations with respect to a voting terminal computer installed in the polling station, and the [the input information] is transmitted to another computer that tabulates the voting data, and is stored in a database; thus, the vote-counting work can be performed immediately.

[0005]

However, the input device of the voting terminal for the aforementioned disclosed technology is designed with the assumption that it will be used by a physically unimpaired person without physical constraints, and no means is provided to accommodate persons with disabilities. With the conventional voting method whereby a paper ballot is filled out by hand, a voter who is visually impaired or whose limbs are impaired – for example, a person who is completely blind – votes by providing the name of a representative who performs the voting for them, and the representative fills out the ballot, for example; this is a problem not only in that this causes extreme distress in terms of protection of privacy, but also in terms of achieving impartial voting. In this situation, even if the Public Offices Election Act which prescribes the self-written voting method is revised in the future to move to an electronic voting system, it is highly probable that the situation, which is disadvantageous to physically impaired persons, will not be improved. On the contrary, for persons who are unskilled at or for whom it is difficult to perform input operations with an information terminal such as a personal computer, there is the risk that the situation will become worse. This runs counter to the implementation of a barrier-free society.

[0006]

In other words, physically impaired persons also often use a standard keyboard on which the alphabet is arranged as an information terminal device such as a PC (personal computer), and in particular even persons whose arms are impaired frequently operate a standard keyboard by means of their feet, and if their feet are impaired and it is difficult to make precise key inputs, they must give up on using a computer. This is because most of the operating systems (OS) and application software for current computers are designed with the assumption that a standard keyboard will be used, so it is impossible to perform all of the input operations with just a few keys.

[0007]

To implement a barrier-free [capability] with an electronic voting system, it is not sufficient merely to use a conventional personal computer for the election; for example, there must be a device which enables all input operations using at most two or three switch means. A simple interface that facilitates input for a physically impaired person is required in terms of both the hardware and the software.

[0008]

As described above, with conventional voting there is the problem in that a large operating load and work load are placed on the voters and the election administrators, and much time and effort are required to vote; in addition, no consideration is made for persons with physical disabilities. This is one factor that hinders improvements in the voting rate. In addition, with electronic voting devices that are being considered for use, no consideration is made for persons with physical disabilities, especially for persons whose limbs are impaired, so currently an electronic voting device that enables persons whose limbs are impaired to vote as easily as a physically unimpaired person has not been implemented.

[0009]

The present invention was devised in response to the aforementioned situation and is, in particular, an electronic voting device with which voting is performed by selecting information pertaining to a specific candidate from information pertaining to multiple candidates displayed on a prescribed display screen, the objective being to provide an electronic voting device equipped with a display means that displays the information pertaining to multiple candidates on the display screen, and an operation means that is constructed with a form and an installation position whereby it is possible for the operator to use a foot to select the information pertaining to a specific candidate from the displayed information pertaining to multiple candidates. This arrangement promotes the computerization of the voting actions, tabulation operations, and the like for an election, and multiple elections can be executed simultaneously with no errors; in addition, physically impaired voters and particularly voters whose hands are impaired can vote easily by means of a candidate selection means which is operated by foot, and [said electronic voting device] provides superior operability and reliability and impartiality with respect to all voters.

[0010]

Means to solve the problem

To solve the aforementioned problems, the present invention provides an electronic voting device having the following construction.

(1) An electronic voting device (voting terminal, foot switch) 2a, 6a with which voting is performed by selecting information pertaining to a specific candidate from information pertaining to multiple candidates displayed on a prescribed display screen (Figure 9, Candidate Selection screen), the electronic voting device 2a, 6a being characterized in that it is equipped with: a display means (LCD panel) 30 that displays the aforementioned information pertaining to multiple candidates on the aforementioned display screen; and an operation means (foot switch)

6a that is constructed with a form and an installation position whereby it is possible for the operator to use a foot to select the information pertaining to a specific candidate from the aforementioned displayed information pertaining to multiple candidates.

(2) The electronic voting device 2a, 6a recorded in Claim 1, characterized in that the aforementioned operation means 6a has a help switch (Figure 6) 6e for the purpose of transmitting to a prescribed reception means a help signal for requesting assistance.

(3) The electronic voting device 2a, 6a recorded in Claim 1 or 2, characterized in that the aforementioned operation means 6a has: tentative selection switches (Figure 6: Forward switch, Back switch) 6b, 6c for the purpose of tentatively selecting any information among the aforementioned information pertaining to multiple candidates displayed on the aforementioned display screen; and a Confirmation switch 6d for the purpose of confirming the information tentatively selected as the information pertaining to the aforementioned specific candidate being voted for using the aforementioned tentative selection switches 6b, 6c.

(4) The electronic voting device 2a, 6a recorded in Claim 3, characterized in that the aforementioned tentative selection switches 6b, 6c include a forward direction switch 6b that goes forward in the aforementioned information that is tentatively selected and a reverse direction switch 6c that goes back in the aforementioned information that is tentatively selected.

(5) The electronic voting device 2a, 6a recorded in Claim 1-4, characterized in that the aforementioned display means 30 switches the display of the information pertaining to the aforementioned multiple candidates screen by screen.

[0011]
Embodiment of the invention

In the following an electronic voting device (hereinafter referred to as the "voting terminal", "electronic voting terminal", "terminal device", and "voting terminal device") which is one application example pertaining to the embodiment of the present invention will be explained with reference to the figures. Figure 1 is an oblique view showing the situation when voting is performed using the voting terminal which is one application example pertaining to the embodiment of the present invention and using the foot switch; Figure 2 is an oblique view of the exterior of the voting terminal in Figure 1; Figure 3 is a structural diagram of the hardware of the voting terminal in Figure 1; Figure 4 is a structural diagram of the software possessed by the voting terminal in Figure 1; Figure 5 is a structural diagram of the programs executed by the voting terminal in Figure 1; Figure 6 is a plan view of the foot switch in Figure 1; Figure 7 is the Language Selection screen displayed by the voting terminal in Figure 1; Figure 8 is the Selection Method Selection screen displayed by the voting terminal in Figure 1; Figure 9 is the Candidate Selection screen displayed by the terminal device in Figure 1; Figure 10 is the Candidate

Confirmation screen displayed by the terminal device in Figure 1; Figure 11 is the Political Party Selection screen displayed by the terminal device in Figure 1; Figure 12 is the Political Party Confirmation screen displayed by the terminal device in Figure 1; Figure 13 is the Judge Selection screen displayed by the terminal device in Figure 1; Figure 14 is the Judge Confirmation screen displayed by the terminal device in Figure 1; Figure 15 is the Local Elections screen displayed by the terminal device in Figure 1; Figure 16 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a single-ballot candidate election; Figure 17 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a restricted-list, proportional representation election; Figure 18 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a national review of the judges of the Supreme Court; and Figure 19 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a local referendum.

[0012]

Figure 2 is an oblique view of the voting terminal 2a of the present application example. In Figure 2, 30 is a touch panel LCD and 33 is a magnetic or IC card reader. With voting terminal 2a shown in Figure 2, a voting card (not shown in the figure) is inserted into card reader 33, and when the voting card is accepted, voting can be performed by using a finger to touch the election display that is displayed on touch panel LCD 30; this is the same as with [a voting terminal] for physically unimpaired persons. When touch panel 30 is not used, voting can be performed by means of an external selection device (to be explained later) that is connected to voting terminal 2a. As will be explained in detail later, with the present application example a foot switch is used as this external selection device. The voting card is discharged from the voting terminal after voting is completed.

[0013]

Figure 3 is a structural diagram of the hardware of voting terminal device 2a shown in Figure 2. In Figure 3, under the control of a CPU 41, LCD 31 displays various screens, such as an initial screen, a Voting Start screen, a Voting Selection screen, a Candidate List screen, a Candidate Details screen, a Voting Confirmation screen, and a Voting End screen.

[0014]

Touch panel 32 provided on LCD 31 is controlled by a control panel control program 15, to be explained later, and houses a switch that detects a touch from the voter's finger; in response to the detection result from the switch, switching between various screens and the like occurs.

[0015]

A flash ROM 40 stores an XML voting program 18, screen files which are retrieved from the XML files therein, a voting data file 27, and the like, to be explained later.

[0016]

In response to XML voting program 18, a WWW browser 17, and a voting control program 16 stored in flash ROM 40, CPU (central processing device) 41 receives and processes commands, data, and the like input from touch panel 32.

[0017]

RAM 42 is a readable/writable memory that functions as voting data memory 20 and the like. ROM 43 is a read-only memory that stores, for example, a diagnostic program [which operates] after the device has been powered on, and a boot program which starts up the system. Communication interface 44 is equipped with a wired or a wireless communication device, controlling data communication with an external host computer and the like as needed. FDD (floppy (registered trademark) disk device) 45 is not used when the aforementioned communication device is used; rather, it is used when voting data is transferred to a separate tabulation device. Card reader 33 reads information stored on voting cards.

[0018]

Figure 4 is a structural diagram of the software possessed by communication [sic; voting] terminal 2a of the present application example. In Figure 4, operating system (OS) 10 is a real-time OS capable of "real-time processing", whereby the desired process is performed within a required amount of time. Serial I/O 11 controls input and output sequentially, one bit at a time, when data is input or output. Window system 12 manages display areas which are partitioned by frames or the like in the screens displayed on a display unit or the like. File system 13 performs file management operations such as file registration, addition, revision, and deletion, and performs file protection, whereby access to specific files is restricted. Card control program 14 controls reading, writing, and the like with respect to IC cards and magnetic cards, for example. Touch panel control program 15 controls inputs to control panel 32 and outputs from control panel 32. Selection device control program 15b controls the input/output of data with respect to the external selection device connected by means of serial I/O 11.

[0019]

     WWW (World Wide Web) browser 17 is a viewer for the purpose of browsing web page descriptive language (XML: eXtensible Markup Language) format files, and is able to decode XML files and display text or images on the screen.

[0020]

     XML voting program 18 is an XML-format file that describes, for example, text formatting (the names of candidates, political party names, and the like), the locations of image files (head shots of candidates and the like), and link destinations. XML voting program 18 operates on browser 17, and operates independently from OS 10. Thus, data that differs for each election – in other words, data that must be updated frequently – is independent of the OS, and by describing it in a simple language such as XML, this data can be created and changed easily.

[0021]

     The present application is based on XML 3.2, and a script (LSIS) extension is performed for the purpose of executing a local system invocation (LSI).

[0022]

     When voting control program 16 receives a message, defined by the aforementioned LSIS and distributed by OS 10, it awakes from a waiting-for-messages state. Voting control program 16 manages a queue and events, so OS 10 is not involved in those relationships.

[0023]

     Furthermore, when a software [sic; virtual] keyboard is displayed on a given screen, window system 12 directly manages that keyboard. In other words, one screen is divided into a portion managed by window system 12 and a portion managed by browser 17, and the keyboard is displayed in a window frame which cannot move independently with respect to the portion of the screen managed by browser 17.

[0024]

     Browser 17 prepares two queues (a queue from browser 17 to voting control program 16, and a queue from voting control program 16 to browser 17) for the purpose of establishing synchronization with voting control program 16, and releases these [queues] with respect to tasks of the voting control program 16. Messages are generated by given events, and the content [of said messages], described with script language, is placed in the queue as is. Therefore, the content of a message must be prescribed by voting control program 16.

[0025]

Browser 17 separates the portion that is read by XML voting program 18 and displayed on the screen and the portion that voting control program 16, having received a message from browser 17, displays on the screen unrelated to HTML [sic; XML] voting program 18 or browser 17, and [browser 17] enables these [portions] to be linked appropriately.

[0026]

Figure 5 is a diagram showing the configuration of the programs executed by voting terminal 2a of the present application example. In Figure 5, when the power is turned on, voting control program 16 starts up and browser 17 starts up. Browser 17 appropriately reads XML voting program 18, which causes the Voting Selection screen and other screens to be displayed. Furthermore, under the control of voting control program 16, data such as voting numbers and candidate numbers are recorded in a one-ballot data memory 20. In addition, when one ballot is completed the aforementioned data is saved in a voting data file 27. Furthermore, as needed a software keyboard 24 is displayed under the control of voting control program 16. Text that is input from keyboard 24 is transmitted to browser 17 and to voting control program 16, and is recorded in memory 20 together with the voting number and with similar data.

[0027]

Figure 6 is a top view of the foot switch 6a used as the aforementioned external selection device of voting terminal 2a of the present application example.

[0028]

Here, the technical background of the aforementioned foot switch 6a will be explained. Conventionally there are known foot switches which enable input operations to be made using the foot as information transmission means for physically impaired persons whose limbs [sic; arms] are impaired (Japanese Patent Publication No. 2910666, Japanese Patent Publication No. 2816837). Various types of foot switches exist: for example, a pedal-type or button-type switch, whereby the foot presses the switch; a joystick foot switch, whereby the angle of the switch is changed using the foot; and a mat-type foot switch, whereby pressure from a pressing operation of the sole of the foot is detected. Foot switches commonly are applied in various fields: for example, for use in driving operations for various mechanisms such as automobiles and industrial machinery; musical uses with musical instruments such as electronic organs and electric guitars; for use in opening and closing automatic doors; and for operations in electronic

dance games. [Such foot switches] have permeated society [for use by] both physically impaired persons and physically unimpaired persons.

[0029]

However, as an input means for an information terminal device such as a PC (personal computer), usually even physically impaired persons use a keyboard on which the alphabet is arranged, and even if a foot switch is used, it is used only in an auxiliary manner. In particular, persons whose arms are impaired frequently operate a standard keyboard using their feet, and if their feet are impaired and it is difficult to make precise key inputs, they must give up on using a computer. This is because most of the operating systems (OS) and application software for current computers are designed with the assumption that a standard keyboard will be used, so it is impossible to perform all of the input operations with just a few keys.

[0030]

With this background, voting terminal 2a of the present application example is constructed such that electronic voting is performed using the foot switch 6a which will be explained in detail hereinafter.

[0031]

Returning to the explanation of the present application example, foot switch 6a in Figure 6 is equipped with a Forward switch 6b and a Back switch 6c, under the indicators "←" and "→"; a Confirmation switch 6d, under the indicator "○"; and a help switch 6e, under a question mark. Forward and Back switches 6b and 6c are used for the purpose of controlling the progress of the voting, and are used to move [between] selection items graphically displayed in the shape of buttons, as shown in Figure 7.

[0032]

Confirmation switch 6d is used for the purpose of confirming a selection; it is used to confirm the selection of a button which indicates that a selection is in progress by making the color or pattern within the frame of the button displayed on the display screen different from the other buttons. Voting terminal 2a of the present application example is constructed such that all operations on the screen displaying voting data can be performed by means of these three operation switches 6b, 6c and 6d.

[0033]

Help switch 6e is used to call an administrator when the voter operating the device does not understand the operation or if a problem occurs. As the means for calling the administrator, the method can be one whereby a signal is transmitted to a terminal (not shown in the figure) being used by the administrator, or one whereby a signal lamp (not shown in the figure) connected to the terminal is illuminated.

[0034]

Figure 1 is an oblique view showing the situation during the actual voting operation when voting terminal 2a and foot switch 6a of the present application example are used. As shown in Figure 1, with the present application example, operations are performed while viewing screens displayed on LCD 30. While viewing the screens, a voter 1a operates foot switch 6a, which is underfoot, with a foot 1a1, and thus selects and decides upon the desired candidate from the candidates displayed on the screen. Furthermore, voting terminal 2a and foot switch 6a are constructed so as to transmit and receive data via a wireless transmission path.

[0035]

Foot switch 6a can employ various configurations, but as shown previously in Figure 6, the foot switch 6a shown in Figure 1 has button-type switches. These also can be mat-type switches (not shown in the figure) and can be placed on the foot rests of a wheelchair, or they can be joystick switches (not shown in the figure), for example, and of course any form of foot switch can be used so as to reduce the burden on the physically impaired voter to the extent possible.

[0036]

Figure 16-19 are flowcharts for the purpose of explaining the flow when a physically impaired voter actually votes using foot switch 6a and voting terminal device 2a of the present application example. Specifically, Figure 16 shows the flow for a single-ballot candidate election; Figure 17 shows the flow for a restricted-list, proportional representation election; Figure 18 shows the flow for a national review of the judges of the Supreme Court; and Figure 19 shows the flow for a local referendum.

[0037]

Before explaining the application example in detail using the figures, an overview of the method of voting will be discussed. First, voter 1a, who is a physically impaired voter, brings their voting card to a booth where a voting terminal 2a is located. Using voting terminal 2a and

the switches of an external selection device such as that shown in Figure 6, voter 1a selects a candidate (candidates) to vote for in one or more elections, confirms [the selection], and [the selection] is recorded (implicitly [sic; automatically]) in a recording device within terminal device 2a, and thus voting is completed.

[0038]
Application Example 1

The actual voting operations for a single-ballot candidate election will be explained with reference to Figure 16. When the voting operations start, a Voting Standby screen is displayed on display 30 of voting terminal 2a in Figure 1 (step S1). The content of the Standby screen can have various configurations, but in terms of conserving power and protecting the display, it is preferable that the design be selected dynamically, according to the type of display: for example, with the background color being black for a CRT tube, and the background color being white for a liquid crystal display.

[0039]
Next, carrying the voting card, the voter arrives at a booth in which a voting terminal 2a is located, and inserts the voting card into voting terminal 2a. The voting card is a magnetic card, IC card, or the like that has been issued by an election administrator prior to the election, and the data recorded thereon is the type of election and the type of voting terminal (for vision/hearing-impaired persons, for physically impaired persons, for physically unimpaired persons, and the like). To preserve anonymity with respect to the election, no information that would identify voter 1a is recorded on the IC card. The data is read from the inserted card, and verification that the voter attribute is that of a physically impaired person [sic] is performed by referencing a server database possessed by the electronic voting system to which voting terminal 2a is connected, and it is confirmed that [the card holder] is the actual person (step S2). If the verification fails, the process returns to step S1 [and] the Voting Standby screen.

[0040]
When it has been confirmed that this is the actual person, the Voting Progress screen is displayed. First, the language to be used is determined. If selections can be made between languages recorded on the card in advance, a Language Selection screen such as that shown in Figure 7 is displayed (step S3). At this time, the "OK" button D is disabled. First, the color of button A changes, and the pointer is displayed above A (hereinafter an action of this type will be described as '(A) is highlighted'). By pressing Forward switch 6b or Back switch 6c of foot switch 6a in Figure 6, buttons B and C also can be highlighted in sequence, with [the buttons

being] highlighted cyclically: A→B→C→A. Prior to the highlighting of each button, the lights for all of the buttons are turned off for an amount of time equal to half of the illumination time [for one button].

[0041]

When voter 1a has pressed the Forward switch 6b or Back switch 6c and the button for the language he will use is highlighted, [the voter] then presses Confirmation switch 6d of foot switch 6a in Figure 6. At this time the color of the highlighted language button changes, and the "OK" button D is enabled. When voter 1a has confirmed that this is the language he wants to use, (step S4), he presses "OK" button D.

[0042]

After the language to be used is set, all of the elections recorded on the card are conducted. The election type in the following explanation is a single-ballot candidate election. First, the Selection screen settings for the election are displayed (step S5). If both a "List selection" A and a "number input" B are permitted, the screen in Figure 8 is displayed and button A is highlighted. When "list selection" button A is highlighted, physically impaired voter 1a presses Confirmation switch 6d of foot switch 6a in Figure 6 (step S6). [Thus] the list selection method is chosen, and a Candidate Selection screen such as that shown in Figure 9 is displayed (step S7). Here, the "previous page" button B is disabled. At this time, if all of the candidates are contained on this screen, "previous page" button B, "next page" button C, and "page _ / _ pages total" button F are not displayed. The buttons for each candidate in A and buttons B-E can be highlighted in sequence by the voter by pressing the forward or the Back switch of the foot switch in Figure 5 [sic; 6].

[0043]

Voter 1a presses buttons B and C and changes the displayed page until the desired candidate is displayed in A (step S9). When this occurs, the candidate name(s) in A and the page numbers in F are updated (step S10). Here, when the first page is displayed, the "previous page" button B is disabled; otherwise, the "Back" button D is disabled. In addition, when the last page is displayed, the "next page" button C is disabled. Furthermore, the displayed candidate buttons which have not been displayed [sic passim; possibly, 'selected'], and the displayed candidate buttons with no [associated] candidate name are deleted. The B button or C button (or the next button, when [C is] not displayed) that is pressed is highlighted.

[0044]

When the name of the candidate for whom voter 1a wants to vote is displayed in A and the button for that candidate is highlighted, the voter presses Confirmation switch 6d (step S8). Consequently, a screen such as that shown in Figure 10 for the selected candidate is displayed (step S12). If a blank ballot is selected (step S11), the Blank Ballot Confirmation screen is displayed (step S13). [Note: Please see the Translator's Note for a discussion on the meaning of a "blank ballot."] To vote for the displayed candidate, voter 1a highlights the "Cast Ballot" button by means of Forward switch 6b or Back switch 6c, and then presses Confirmation switch 6d (step S14). The selected candidate is printed with a printer and is recorded in a recording device, and is transmitted via a network (step S15).

[0045]

When it has been confirmed that voting occurred correctly, an audible guidance stating "Please take your card" is output from a speaker (step S16). This audio is repeated until the voter or an attendant removes the voting card from the terminal device (step S17). When the voter or the attendant removes the voting card, the audible guidance stops and voting terminal 2a again displays the Standby screen (step S18). Thus, voting in a single-ballot candidate election is completed.

[0046]

Application Example 2

Next, an application example involving a restricted-list, proportional representation election will be explained. When the voting operations begin and selection of the language as in Application Example 1 has been completed (step T1 – step T4), the screen shown in Figure 11 is displayed (step T5). The "previous page" button B is disabled. If all of the political parties are contained on this screen, buttons B, C, and E are not displayed. In A, the button for the first political party is highlighted (in the figure, '05 Azuchi party' is displayed in gray tone). Voter 1a presses button B or C and changes the displayed page so as to display the party he wants to vote for in button A (step T9). The party names in A and the page numbers in E are updated. If the first page is displayed, the "previous page" button B is disabled; otherwise, "Blank Ballot" button D is disabled. Furthermore, when the last page is displayed, the "next page" button C is disabled. Furthermore, the displayed party buttons which have not been displayed, and the displayed party buttons with no [associated] party name are deleted. The pressed buttons are highlighted sequentially, beginning with button B or button C (or the next button, when [C is] not displayed).

[0047]

When the name of the party that voter 1a wants to vote for is displayed in A, the voter highlights the button for that party name and presses the Confirmation switch (step T8). Consequently, a screen such as that shown in Figure 12 for confirmation of the selected party is displayed. If a blank ballot is selected (step T11), the Blank Ballot [Confirmation] screen is displayed (step T13). To vote for the displayed party (or to cast a blank ballot), voter 1a highlights the "Cast Ballot" button and presses the Confirmation switch (step T14). Consequently, the selected party is printed with a printer and is recorded in a recording device, and is transmitted via the network to a tabulation center (step T15). When it has been confirmed that voting occurred correctly, an audible guidance stating "Please take your card" is output from a speaker (step T16). This audio is repeated until the voter or an attendant removes the voting card from the terminal device (step T17). When the voter or the attendant removes the voting card, the audible guidance stops and the voting terminal again displays the Standby screen (step T18). Thus, voting in a restricted-list, proportional representation election is completed.

[0048]

Application Example 3

Next, a national review of the judges of the Supreme Court will be explained with reference to Figure 18. The operations (step U1 – step U4), wherein voter 1a inserts the voting card, is confirmed as the actual person, and selects the language, are identical to those in the previously explained Application Example 1 and 2.

[0049]

First, the Judge Selection screen in Figure 13 is displayed (step U5). At this time, button B is disabled. If all of the judges are contained on this screen, buttons B, C, and E are not displayed. By pressing the forward or Back switch, the button for each judge in A, and buttons B through D are highlighted sequentially. Voter 1a selects and highlights the button for the judge in A whom he wants to recall, and then presses the Confirmation switch (step U8). The color of the button for the selected judge changes and a mark is appended. The buttons [for the judges] are highlighted sequentially beginning with a [pre]determined button (step U11).

[0050]

To display another page, voter 1a highlights button B or C and presses the Confirmation switch (step U9). Consequently, the names of the judges in A and the page number in E are updated (step U10). When the first page is displayed, button B is disabled; when the last page is displayed, button C is disabled. Furthermore, the displayed judge buttons which have not been

displayed and the displayed judge buttons with no [associated] judge name are deleted. The pressed buttons are highlighted sequentially, beginning with button B or button C (or the next button, when [C is] not displayed). Voter 1a repeats these operations to select all of the judges whom he wants to recall.

[0051]

When the voter confirms that the color has changed for the buttons for all of the judges whom he wants to recall, and highlights a "Decide" button and presses the Confirmation switch (step U12), the Judge Confirmation screen in Figure 14 is displayed (step U13). In Figure 14, the names of the selected judges in A are displayed; furthermore, button B is disabled. If all of the selected judges are contained on this screen, buttons B, C and F are not displayed.

[0052]

To display another page, voter 1a highlights button B or C and presses the Confirmation switch. The names of the selected judges in A and the page numbers in F are updated. Here, when the first page is displayed, button B is disabled; when the last page is displayed, button C is disabled. The pressed buttons are highlighted sequentially, beginning with button B or button C (or the next button, when [C is] not displayed).

[0053]

Voter 1a confirms the selected judges displayed on the screen, highlights the "Cast Ballot" button, and presses the Confirmation switch (step U14). The selected judge is printed with a printer and is recorded in a recording device, and is transmitted via the network to a tabulation center (step U15). When it has been confirmed that voting occurred correctly, an audible guidance stating "Please take your card" is output from a speaker (step U16). This audio is repeated until the voter 1a or an attendant removes the voting card from the terminal device (step U17).

[0054]

When voter 1a or the attendant removes the voting card, the audible guidance stops and voting terminal 2a again displays the Standby screen (step U18). Thus, voting in a national review of the judges of the Supreme Court is completed.

[0055]

Application Example 4

[Voting in] a local referendum will be explained with reference to Figure 19. The operations (step V1 – step V4), wherein voter 1a inserts the voting card, is confirmed as the actual person, and selects the language, are identical to those in the previously explained Application Examples 1-3. The Local Elections screen in Figure 15 is displayed (step V5). At this time the "previous page" button B is disabled. If all of the options are contained on this screen, buttons B, C, and D are not displayed. By pressing the forward or Back switch, the button for each option in A, and buttons B through D are highlighted sequentially (step V9).

[0056]

Voter 1a highlights and presses [sic] button B or C and changes the displayed page so as to display the option for the bill he wants to select in A (step V10). The names of the options in A and the page number in D are updated. Here, when the first page is displayed, button B is disabled; when the last page is displayed, button C is disabled. Furthermore, the displayed option buttons which have not been displayed and the displayed option buttons with no [associated] option name are deleted. The pressed buttons are highlighted sequentially, beginning with button B or button C (or the next button, when [C is] not displayed). When the option voter 1a wants to select is displayed in A, the voter presses that option button (step V8). The Local Elections Confirmation screen for the selected option is displayed, and the "Cast Ballot" button and "Back" button are highlighted alternately.

[0057]

To vote with respect to the displayed option, voter 1a highlights the "For" or "Against" button and presses the Confirmation switch (step V12). The selected option is printed with a printer and is recorded in a recording device, and is transmitted via the network to a tabulation center (step V15).

[0058]

When it has been confirmed that voting occurred correctly, an audible guidance stating "Please take your card" is output from a speaker (step V16). This audio is repeated until the voter or an attendant removes the voting card from the terminal device (step V17). When voter 1a or the attendant removes the voting card, the audible guidance stops and voting terminal 2a again displays the Standby screen (step V18). Thus, voting in a local referendum is completed.

[0059]

The present invention achieves the following effects. In summary, by connecting an external selection device, the effect is that voting can be performed easily, and the election information and voting information can be transmitted by means of a system whereby a voter who is physically impaired is able to perform voting operations merely by using a few foot switches; therefore, the effect is that an impartial voting environment can be provided for voters. Furthermore, by adding a wireless communication capability, the effect is that [the voting terminal] can be installed at any site within a close range, so the degree of freedom with respect to installation is improved.

[0060]

Effect of the invention

As described in detail above, the present invention is an electronic voting device with which voting is performed by selecting information pertaining to a specific candidate from information pertaining to multiple candidates displayed on a prescribed display screen, and is equipped with: a display means that displays the information pertaining to multiple candidates on the display screen; and an operation means that is constructed with a form and at an installation position whereby it is possible for the operator to use a foot to select the information pertaining to a specific candidate from the displayed information pertaining to multiple candidates. This arrangement promotes computerization of the voting actions, tabulation operations, and the like for an election, and multiple elections can be executed simultaneously with no errors occurring; in addition, physically impaired voters and particularly voters whose hands are impaired can vote easily by means of a candidate selection means which is operated by foot, and [said electronic voting device] provides superior operability and reliability and impartiality with respect to all voters.

Brief description of the figures

Figure 1 is an oblique view showing the situation when voting is performed using the voting terminal which is one application example pertaining to the embodiment of the present invention and using the foot switch.

Figure 2 is an oblique view of the exterior of the voting terminal in Figure 1.

Figure 3 is a structural diagram of the hardware of the voting terminal in Figure 1.

Figure 4 is a structural diagram of the software possessed by the voting terminal in Figure 1.

Figure 5 is a structural diagram of the programs executed by the voting terminal in Figure 1.

Figure 6 is a plan view of the foot switch in Figure 1.

Figure 7 is the Language Selection screen displayed by the voting terminal in Figure 1.

Figure 8 is the Selection Method Selection screen displayed by the voting terminal in Figure 1.

Figure 9 is the Candidate Selection screen displayed by the terminal device in Figure 1.

Figure 10 is the Candidate Confirmation screen displayed by the terminal device in Figure 1.

Figure 11 is the Political Party Selection screen displayed by the terminal device in Figure 1.

Figure 12 is the Political Party Confirmation screen displayed by the terminal device in Figure 1.

Figure 13 is the Judge Selection screen displayed by the terminal device in Figure 1.

Figure 14 is the Judge Confirmation screen displayed by the terminal device in Figure 1.

Figure 15 is the Local Elections screen displayed by the terminal device in Figure 1.

Figure 16 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a single-ballot candidate election.

Figure 17 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a restricted-list, proportional representation election.

Figure 18 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a national review of the judges of the Supreme Court.

Figure 19 is a flowchart showing the flow when the voting terminal and foot switch in Figure 1 are used to vote in a local referendum.

Explanation of symbols

2a   Voting terminal (electronic voting device)

6a   Foot switch (electronic voting device)

6b   Forward switch (forward direction switch, tentative selection switch)

6c   Back switch (reverse direction switch, tentative selection switch)

6d   Confirmation switch
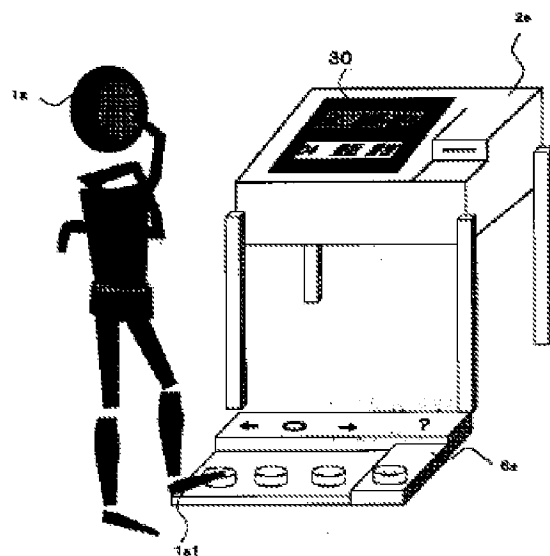
6e   Help switch

30   LCD panel (display means)
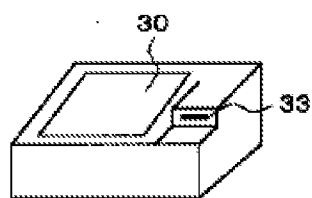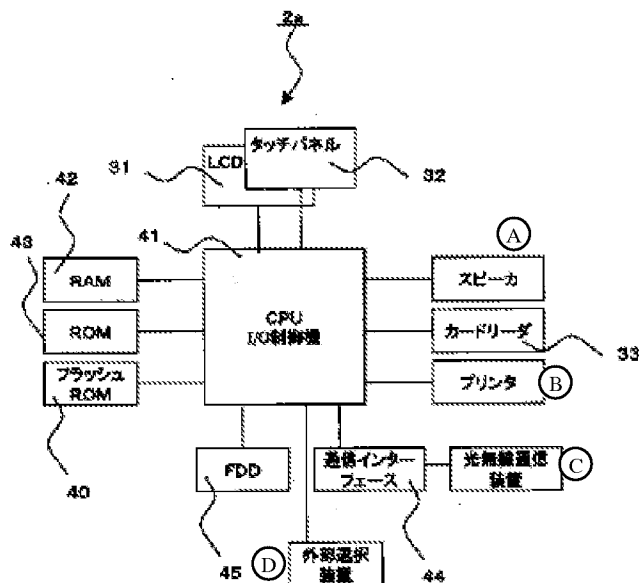
Figure 1

Figure 2

Figure 3

Key: A   Speaker
      B   Printer
      C   Wireless communication device
      D   External selection switch
      32   Touch panel
      33   Card reader
      40   Flash ROM
      41   CPU
             I/O controller
      44   Communication interface

Figure 4

Key: 11 Serial I/O
12 Window system
13 File system
14 Card control program
15 Touch panel control program
15b Selection device control program
16 Voting control program
17 WWW browser
18 XML voting program

Figure 5

Key: A Voting number, candidate number
B [Illegible]

C   Written when casting of one ballot is completed
D   Map request ([illegible])
E   Letter 'A'
F   Letter 'A' pressed ([illegible] simultaneously with main)
16   Voting control program
17   Browser
18   HTML voting program
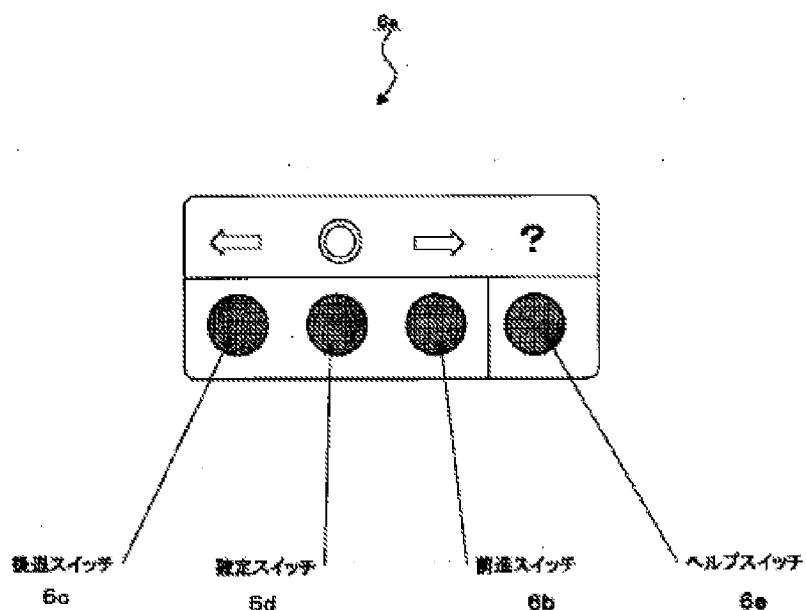20   One-ballot data memory
24   Keyboard
27   Voting data file

退進スイッチ   決定スイッチ   前進スイッチ   ヘルプスイッチ
6c   6d   6b   6e

Figure 6

Key: 6b   Forward switch
      6c   Back switch
      6d   Confirmation switch
      6e   Help switch
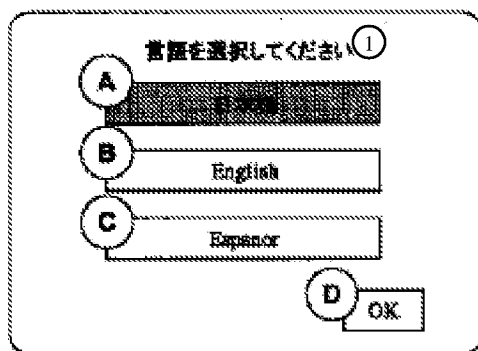
Figure 7

Key: 1   Please select a language
      A   Japanese
      C   Spanish

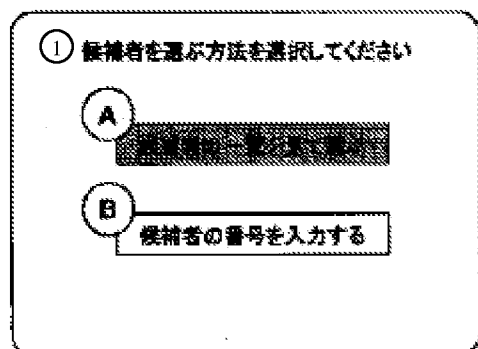Figure 8

Key: 1   Please select the candidate selection method
      A   Selection from candidate name list
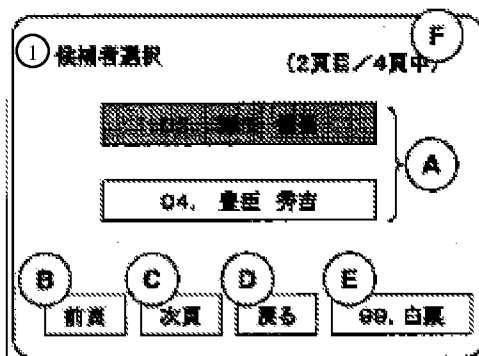   B   Input of candidate number

Figure 9

Key: 1   Candidate selection

A	[illegible Japanese name]
	Takayoshi Richigo
B	Previous page
C	Next page
D	Back
E	Blank ballot
F	Page 2/4 pages total

Figure 10

Key:	1	Select "Cast Ballot" to cast your vote; select "Back" to change your selection.
	2	Nobunaga Shikida
	3	Back
	4	Cast Ballot

Figure 11

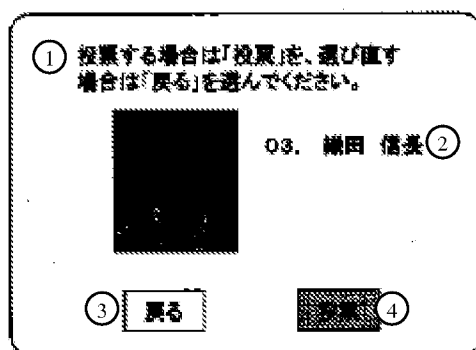| Key:	1	Party selection
	A	Azuchi party
		Momoyama party
	B	Previous page
	C	Next page
	D	Blank ballot
	E	Page 3/4 pages total

Figure 12

Key: 1   Select "Cast Ballot" to cast your vote; select "Back" to change your selection.
      2   Azuchi party
      3   Back
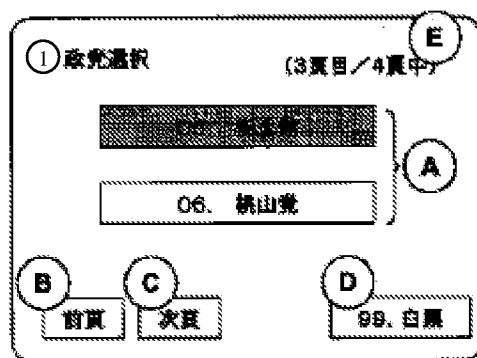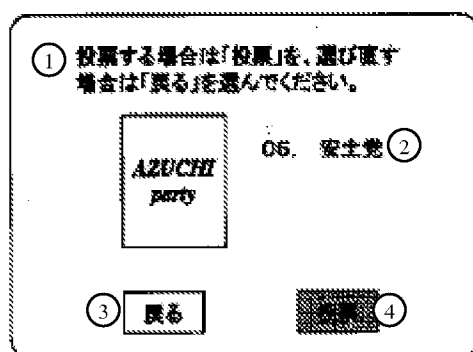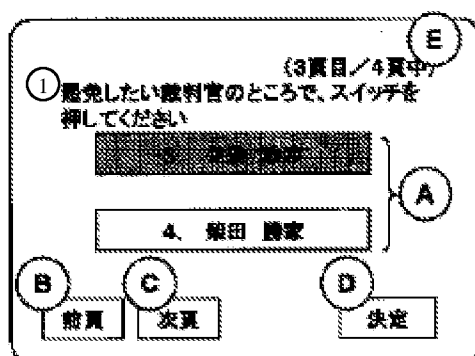   4   Cast Ballot

Figure 13

Key: 1   Press the switch for the judge you wish to recall
      A   [Illegible Japanese name]
           Hirokzau Shibata
      B   Previous page
      C   Next page
      D   OK
      E   Page 3/4 pages total

Figure 14

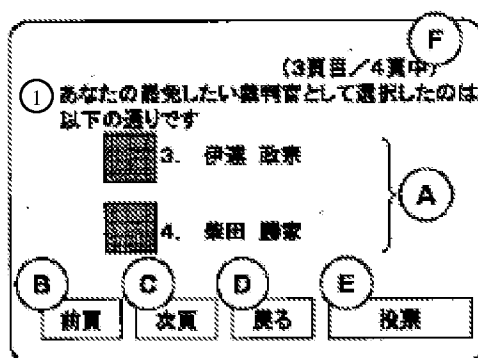Key: 1   The judges you have chosen to recall are as follows:
        A   Seiji Adachi
               Hirokazu Shibata
        B   Previous page
        C   Next page
        D   Back
        E   Cast Ballot
        F   Page 3/4 pages total

Figure 15
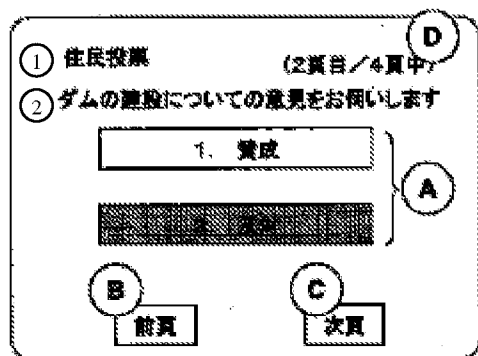
Key: 1   Local referendum
        2   Please provide your opinion regarding construction of the dam
        A   For
               Against
        B   Previous page
        C   Next page
        D   Page 2/4 pages total

Figure 16

Key: A   Start
        B   End
        S1   Display Voting Standby screen
        S2   Voting card inserted?
        S3   Display Language Selection screen
        S4   Language selected?
        S5   Display Candidate Selection Method Selection screen
        S6   Selection method selected?
        S7   Display Candidate Selection screen
        S8   Button for candidate selected and confirmed?
        S9   Previous Page or Next Page button selected?
        S10   Display another Candidate Selection screen
        S11   Blank Ballot button selected?
        S12   Display Candidate Confirmation screen
        S13   Display Blank Ballot Confirmation screen
        S14   Candidate (or blank ballot) selected and Cast Ballot button pressed?
        S15   Print selected candidate with printer, record in recording device, and transmit via
                network

S16   Announce "Please take your card" from speaker
S17   Voting card removed?
S18   Display Voting Standby screen

Figure 17

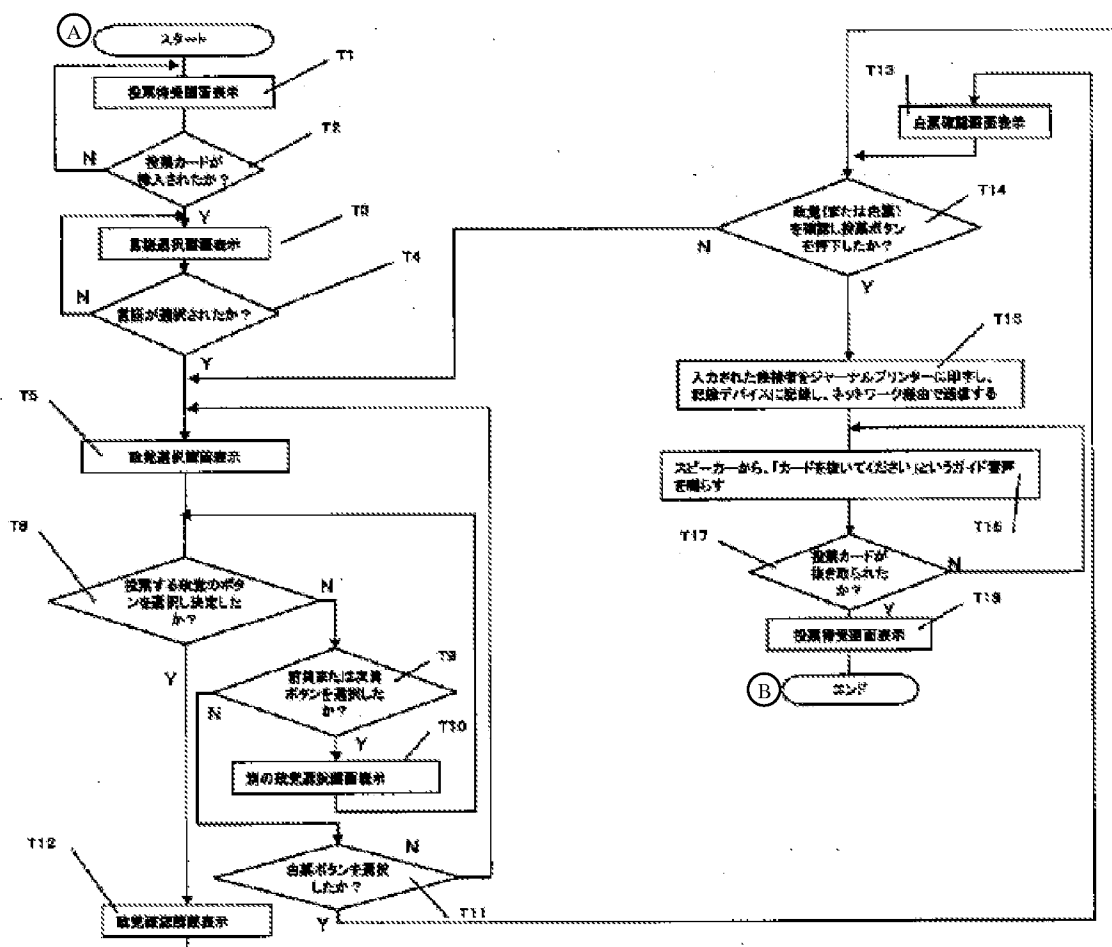Key: A   Start
        B   End
        T1   Display Voting Standby screen
        T2   Voting card inserted?
        T3   Display Language Selection screen
        T4   Language selected?
        T5   Display Party Selection screen
        T8   Button for party to vote for selected and confirmed?
        T9   Previous Page or Next Page button selected?
        T10   Display another Party Selection screen
        T11   Blank Ballot button selected?
        T12   Display Party Confirmation screen
        T13   Display Blank Ballot Confirmation screen

T14 Party (or blank ballot) selected and Cast Ballot button pressed?
T15 Print selected candidate [sic; party] with printer, record in recording device, and
     transmit via network
T16 Announce "Please take your card" from speaker
T17 Voting card removed?
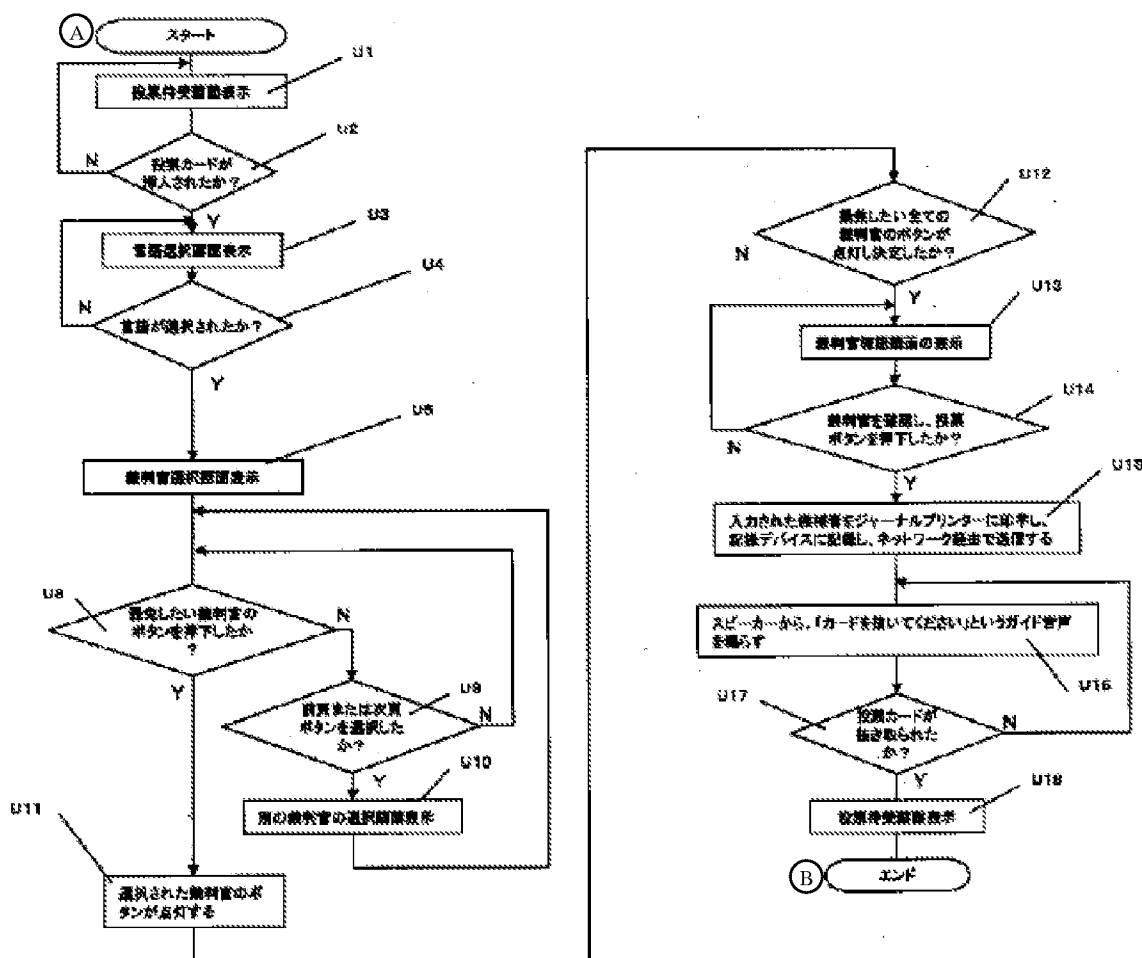T18 Display Voting Standby screen

Figure 18

Key: A   Start
      B   End
      U1   Display Voting Standby screen
      U2   Voting card inserted?
      U3   Display Language Selection screen
      U4   Language selected?
      U5   Display Judge Selection screen
      U8   Button for judge to recall pressed?
      U9   Previous Page or Next Page button selected?
      U10   Display another Judge Selection screen

U11 Highlight the button for selected judge
U12 Buttons for all judges to be recalled highlighted and confirmed?
U13 Display Judge Confirmation screen
U14 Judge confirmed and Cast Ballot button pressed?
U15 Print selected judge with printer, record in recording device, and transmit via network
U16 Announce "Please take your card" from speaker
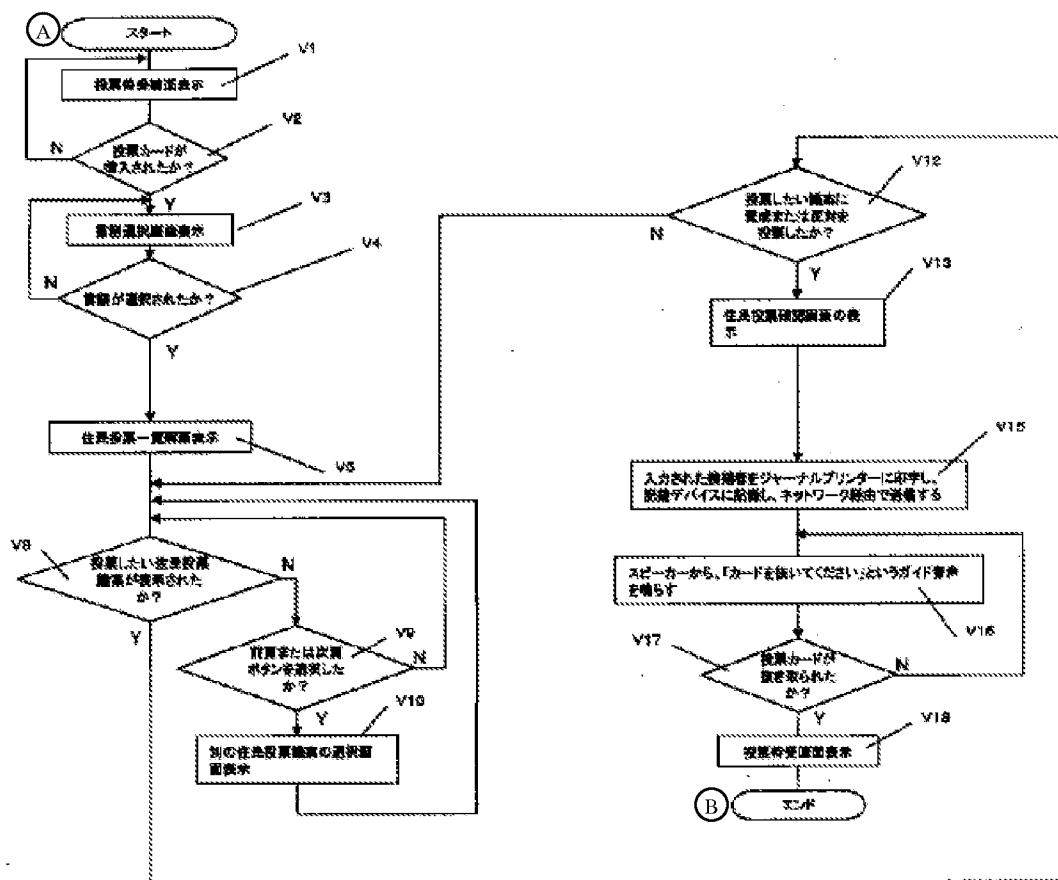U17 Voting card removed?
U18 Display Voting Standby screen

Figure 19

Key: A   Start
      B   End
      V1   Display Voting Standby screen
      V2   Voting card inserted?
      V3   Display Language Selection screen
      V4   Language selected?
      V5   Display Local Elections screen
      V8   Desired bill to vote on displayed?
      V9   Previous Page or Next Page button selected?

V10 Display another
V12 "For" or "Against" vote cast with respect to bill?
V13 Display Local Elections Confirmation screen
V15 Print selected candidate [sic; option] with printer, record in recording device, and transmit via network
V16 Announce "Please take your card" from speaker
V17 Voting card removed?
V18 Display Voting Standby screen

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